

CACTUS AND SUCCULENT JOURNAL

Of the Cactus And Succulent Society
Of America

Vol. XX

JULY, 1948

No. 7

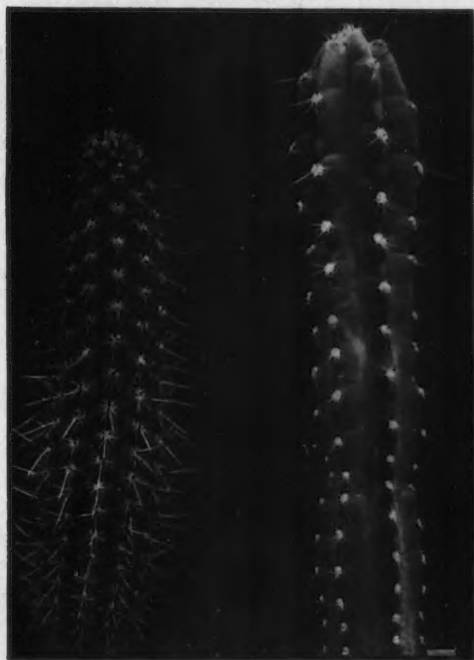


FIG. 66. LEFT: Undetermined seedling from Peru.
RIGHT: *Pilocereus Russelianus*, juvenile plant from
R. W. Kelly.



CACTUS AND SUCCULENT JOURNAL

Published and Owned by the Cactus and Succulent Society of America, Inc., Box 101, Pasadena 16, California. A monthly magazine to promote the Society and devoted to Cacti and Succulents for the dissemination of knowledge and the recording of hitherto unpublished data in order that the culture and study of these particular plants may attain the popularity which is justly theirs. U.S.A. and Latin Am. \$3.00. Foreign \$3.50 per year by international money order. Membership in the Cactus Society free with subscription. Mail application to SCOTT HASELTON, Editor, Box 101, Pasadena 16, Calif. Editorial Staff: THE ENTIRE SOCIETY. Entered as Second Class Matter at Pasadena, Calif., under act of March 3, 1879.

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PROPOSAL TO AMEND THE BY-LAWS OF THE CACTUS AND SUCCULENT SOCIETY

Amend Article IV—Section 1—second paragraph, to read as follows:

A meeting shall be held after August the first and not later than August the twentieth, at which time a nominating committee of five members shall be elected by ballot. It shall then also designate the time and place for the annual meeting of the Society.

Amend Article VI—Section 1—to read as follows:

Annual Meeting. The annual meeting of the Society shall be held not later than September the fifteenth, at which time the report of the nominating committee will be received and read. Additional nominations shall be received from the floor.

Amend Article VII—Section 1—first paragraph, to read as follows:

Nominations. The nominating committee shall return two nominations for each elective office.

Amend Article VIII—Section 1—to read as follows:

It shall be the duty of the Editor, to include in the October issue of the JOURNAL, a copy of the ballot, to be furnished by the Society, one copy of the ballot being sent to each active member and only the official ballot shall be counted when returned. The Board shall at this time furnish the Editor, sufficient volunteer help to place the ballots in the JOURNAL before mailing.

The above amendments to the by-laws of the Society are offered at the special meeting of the Board to be called Friday, May 28th, 1948.

Respectfully submitted,

HOMER RUSH, *Chairman.*

DR. YALE E. DAWSON, *Member.*

EDWARD S. TAYLOR, *Member.*

FROM COSTA RICA

As usual there is some evocative note to nudge one's memory, such as the reference to *Rhipsalis* in Africa, which brings to mind a personal chain of experience: in June, 1906, I shot on the tidal flats of the Rio Tempisque (CR) on one of the cattle fencas

of don Bernardo Soto, called Palo Verde, two fine adult tree ducks which proved to be *Dendrocygna viduata*, a first record for Costa Rica of this very handsome duck, and one of them is now in the Carnegie Institute at Pittsburgh. In Nov., 1921, en route for home from Uganda, a breakdown of our steamer not far from Rejaf enabled two of us to borrow a dinghy from the Capt. for a cruise on those fascinating waters of the Upper Nile; among the species of duck we shot was *Dendrocygna viduata*. As you will imagine this was a very great and pleasant surprise and also suggests that Dr. Harold E. Anthony might revise his ruling as to the doubtfulness of the truth of the theory of migratory connection.

I was frequently in Central Uganda in rather xerophytic gneiss boulder strewn country, *Rhipsalis* (cassytha?) associated with *Cissus quadrangularis* and the broad entire leaved *Platyserium* of Uganda so common a feature with an abundant sp. of *Cissia* and indeed have somewhere a photo of this complex.

C. H. LANKESTER.

NEW EDITION OF THE STUDY OF CACTI

The revised edition of Mrs. Vera Higgins' *The Study of Cacti* is now ready for delivery. This is the best and only summary of the Britton and Rose classification. Understandable and especially recommended for beginners who wish to grasp the fundamentals in the study of cacti. The book contains 24 photos and a comprehensive chart for studying the differences in the various cactus forms. Postpaid in U.S.A. \$3.00.

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The above scale compares centimeters with inches (approx. 2½ cm. equals 1 in.). 10 mm. equals 1 cm.; 10 cm. equals 1 dm.; 10 dm. equals 1 meter (approx. 39 in.).



FIG. 67. Primitive tapping of *Euphorbia tirucalli* in Umgeni River Valley, Natal. Note goggles worn by native tapper to prevent latex entering the eyes.

EUPHORBIA TIRUCALLI RUBBER

By R. A. DYER

A number of readers will remember the following paragraph taken from the Succulent Euphorbiae, 1941, p. 106:

"An analysis of the coagulum of the Tirucalli latex, made at the Imperial Institute, showed that it contains only 15.7% of caoutchouc,

against 82.1% of resin, 1.3% of protein and insolubles 0.9%. And so today many persons who have been disappointed in their expectations of the species, instead of speaking of Tirucalli rubber, refer to it as Tirucalli rubbish."

It is no secret that during the past war, the

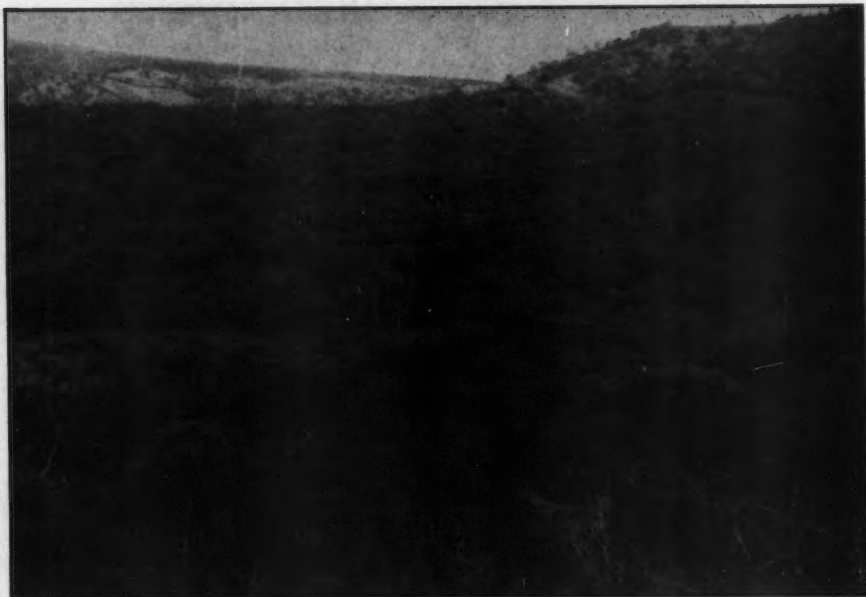


FIG. 68. A forest of *Euphorbia tirucalli* in the Umgeni River Valley, Natal.



FIG. 69. Trees of *Euphorbia tirucalli* with excellent trunks for tapping.

(For close-up view of *E. tirucalli* see "The Succulent Euphorbieae," Vol. I, pg. 104. This plant is easy to grow and is common in collections as a hedge plant.)



FIG. 70. Primitive tapping for *Euphorbia tirucalli* latex.

rubber position of the Allies was, for some considerable period, in a very precarious state. Efforts were made in most countries to augment the supply of natural rubber. The United States, for instance, concentrated much attention on "Guayule" rubber, while in the Union of South Africa a small Committee explored the local flora with its many latex yielding plants. As was only to be expected, a regular stream of suggestions arrived from the public, many of whom considered that the vast quantities of trees and shrubs of *Euphorbia* were the complete answer to the problem. The paragraph about *Euphorbia tirucalli* rubbish was quoted to many a correspondent in order to damp his enthusiasm. But largely due to the faith and perseverance of Mr. A. Davidson, a pioneer in this field, *E. tirucalli* was again put to the test. Some idea of the size of some of the individual trees and the extent of the forests in the Umgeni Valley, Natal, may be gained by a study of the accompanying pictures.

The primitiveness of the first method of tapping may be judged from the photograph showing milk tins set to collect latex after the tree had been deeply gouged. The yield of latex per tree, however, was quite appreciable for the first tapping, but it was found that disease often

entered the wounds and some trees died altogether. More scientific methods of tapping, as for *Hevea* latex, were introduced later, but it was soon found, even by these means, that, while the initial flow of latex was quite promising, the subsequent retappings gave smaller and smaller yields. Thus it was obvious that practically all the millions of trees of *E. tirucalli* would have to be tapped if any appreciable tonnage of rubber was to be extracted.

While the latex flow and yield were under investigation, tests were being made to extract rubber of a sufficiently high grade for commercial purposes. The figures for the analysis of the latex of 15.7% caontchone against 82.1% resin were found to be approximately correct for most first tappings and the old estimate that it was *Tirucalli* rubbish could not at first be disproved. In any case it was a hopelessly low yield of rubber when viewed from the angle of total requirements, and in addition the resin also was of poor quality. Just when it appeared that an extraction process of good quality rubber was to be successful, synthetic products came forward in greater supply, and rubber production from *E. tirucalli* and all the other succulent species of *Euphorbia* was once again abandoned.



FIG. 71. Tapping *Euphorbia ingens* is far more difficult owing to its hard, rough bark.

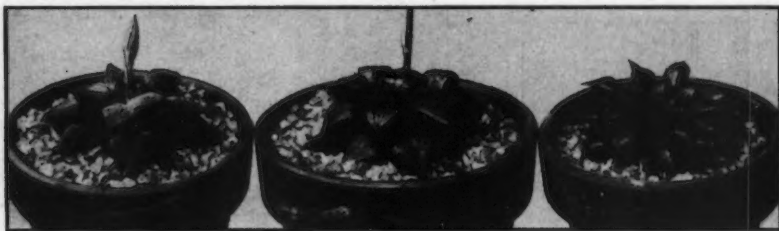
*Haw. asperula*

FIG. 72.

*Haw. picta**Haw. paradoxa*

THE CULTURE OF HAWORTHIAS IN CONNECTICUT

By RALPH G. VAN NAME

Photographs by author of Haworthias in his collection.

In the climate of New England, even the southern part, Haworthias must be kept under glass for at least seven months in the year. During this period they continue in more or less active growth, some species even blooming in December and January, and for this reason Haworthias need to be wintered in a place where they receive plenty of well-distributed natural light. If the lighting is inadequate it leads, sooner or later, to spindling or abnormal growth, a condition which disfigures the plant and often takes years to cure.

The most favorable place for the plants during the winter months is unquestionably a greenhouse, and they may, if desired, be kept there the year round with entirely satisfactory results. To grow Haworthias in the home is less easy, and calls for good judgment in choosing their winter location, and for intelligent care. A sun porch is often a good location, or a bay window in a cool room. A place near a window in a warm living room is frequently bad. Since warmth and moisture accelerate growth, and thus increase the light requirement of the plants, it follows that unless the lighting is ample, water should be given only sparingly and the temperature kept on the cool side.

For most Haworthias, however, a very sunny location is undesirable. The ability to tolerate strong sunlight varies widely with the species, but that of a given plant can usually be increased by hardening in light of somewhat lower intensity, thus giving the plant time to set up its own defense mechanism. The colors assumed by some Haworthias when growing in strong light—colors which range from a pinkish shade to deep brown or even red—are obviously a part of this defense and may, incidentally, be useful as a guide to the grower. On the other hand, some of the more sensitive species can be severely injured by sunburn, even by an accidental exposure of only a few hours'

duration, a possibility which it is well to bear in mind.

The kind of light which is most acceptable to the plants, and which they can utilize most efficiently and completely, is light which is of only moderate strength and is diffused, that is, comes from various directions and not predominantly from one. It is this characteristic which makes the lighting in a bay window particularly favorable for plants. It should also be noted in this connection that light which reaches the plants through vertical panes alone has lost, by reflection from the outer surface of the glass, a considerable part of those rays which came from a high angle. The plants may thus fail to get enough "top light," which plants growing in a greenhouse, or in the open air, receive in abundance.

In May, or as soon as the danger of frost is over, Haworthias should as a rule be placed out of doors for the summer. This transfer is usually very beneficial to the health and vigor of the plants, and it is unwise to omit it unless they are in a greenhouse or other exceptionally favorable place. It should never be omitted in the case of plants which have been handicapped by light deficiency during the winter.

The simplest expedient is to plunge the pots in the ground in some place where adjacent trees or structures provide the right amount of shade. Additional shade, if needed, can be supplied by means of screens made of laths spaced about one inch apart. Such screens are most effective if so placed that the laths run up and down when the screen is set up on edge, or north and south when it is laid horizontally. Plunging the pots in this manner has its drawbacks. Heavy rains incrust the plants with dirt, and it is often no easy task to get them really clean again when they are returned to their winter quarters. They are also fully exposed to injury by garden slugs and other enemies of

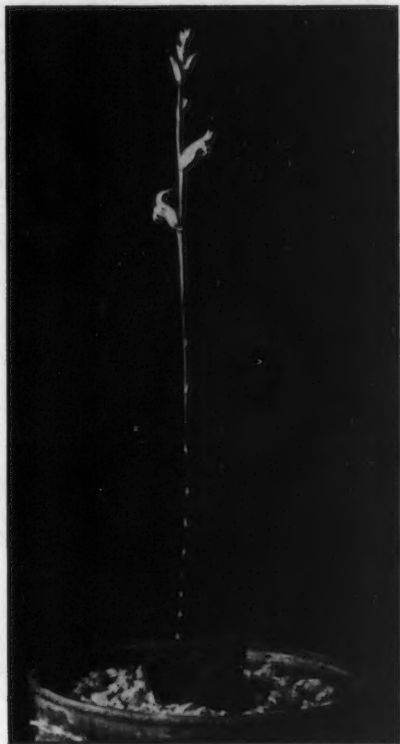


FIG. 73.
Haw. Maughani

plant life. But the benefits mentioned above outweigh the disadvantages.

In some cases a suitably situated veranda may be available as a place to install the pots during the summer, an alternative which may or may not be preferable to the one just considered. A lath house constructed for the special purpose of housing succulents during the summer would probably be very satisfactory, but I know of no case in which that plan has been tried in this region. Lath houses are not well known in Connecticut.

My own collection of Haworthias and Apicras is kept throughout the year in a 16' by 16' greenhouse which also contains a larger group of other succulents, and is of the lean-to type, facing south. Most of the shading required is given by wooden slat shades which when fully lowered cover the entire roof: the rest is obtained by whitening certain areas of the glass end-walls. I try to give the Haworthias as much diffused sunlight as possible, but to avoid exposing them to direct sunlight except for brief periods, or when the sun is low. A few dark

colored species, such as *H. Schmidtiana* and *H. limifolia*, are exceptions to this rule and are intentionally given a sunny location. In general, the plants are moved about in the greenhouse rather freely as a means of determining the position most favorable for each species. A few, such as *H. Bolusii* var. *aranea* and *H. angustifolia*, seem to do best in almost complete shade.

The heating and ventilation of the greenhouse are regulated entirely by hand. Its temperature often drops to 50° F. on winter nights but seldom reaches 40°, the intended minimum. In very hot summer weather, with all means of ventilation wide open including the outside door, the maximum is about 100°. With the door kept closed, as is sometimes necessary, the temperature might reach 110°.

My standard potting soil for Haworthias is the usual mixture of equal parts of leaf mold, garden soil and sand, to which I always add about three per cent of its volume of crushed old lime mortar, and frequently add also a little rich clay loam, in amount about equal to that of the mortar.

All plants in my greenhouse are given a thorough spraying with a mineral oil emulsion, or other equivalent general spray, about twice per month. Perhaps as a result of this treatment I find that my Haworthias are but little troubled by other pests and that only mealy bugs, including both the ordinary type and the



FIG. 74.
Haw. Chalwinii

so-called root mealy bugs, are a serious menace to their welfare. No spraying is effective against mealy bugs unless they are working in the open, and the chief danger comes from infestations in such places as the narrow crevices at the leaf bases, or underground. Since these hidden infestations can usually be detected in their early stages by careful inspection of the plants, the value of frequent inspection, especially of specimens which are highly prized or irreplaceable,



FIG. 75.
Haw. papillosa

hardly needs to be stressed. In later stages these infestations become increasingly easy to detect, though the damage is then greater, and in any case should be thoroughly cleaned up by hand as soon as discovered. A very small brush moistened with the spray solution is convenient for this purpose.

When a Haworthia is ailing without evident cause, one should not hesitate to lift it from the pot to examine the roots. This may reveal damage by mealy bugs or some other pest, but it is not unusual to find that the plant has lost a large part of its root system through decay, generally caused by poor drainage or overwatering. Such a loss of roots can usually be cured without much difficulty, but may be serious if the infection has penetrated beyond the roots into the body of the plant. The treatment consists in cutting back all damaged roots to sound tissue, dusting the cut surfaces with powdered sulphur, and after waiting a few days for these

areas to become thoroughly callused, re-rooting the plant in slightly moist sand.

A noteworthy characteristic of this genus is the great diversity between the different species with respect to the season of the year in which they flower. In my greenhouse the normal duration of the blooming period may be two weeks or three months, depending on the species, but these periods are so distributed that there is no month in the year in which there are not at least two or three species in flower. Of the winter bloomers—by which I mean those species which do all or the greater part of their flowering during the three winter months—*H. Haageana* and *H. Hurlingii* are typical examples, as are also several species from the section *Retusae*. Such winter bloomers are by no means rare. In my present collection of Haworthias about one species in every ten belongs to this group.

The watering of Haworthias in a greenhouse or other indoor location is not difficult. In warm weather, and with good ventilation, the plants may be watered freely, since any excess moisture is soon removed by evaporation. But in winter, when the greenhouse temperature is often low and the ventilation less effective, excess moisture is a source of serious danger to the plants, and to avoid this the watering must be gradually cut down, both in amount and frequency, as winter approaches. Other cold-weather precautions which are more or less helpful and are often recommended are the following: (1) To water early, before the warmest part of the day, and preferably in sunny weather. (2) To warm the water to about 65° before using. (3) To apply the water to the soil only, allowing no water to gather or stand in hollows or crevices in the plants.

My own practice in watering can be briefly stated as follows: In summer I give the pots as much water as the soil will readily absorb about once in two days or, if the weather is very hot, once per day. In the coldest part of winter I water, rather sparingly, about once per week or a bit oftener, my aim being to allow the soil to become nearly dry, but not bone-dry, between waterings. Between these two extremes the watering is, of course, adjusted to suit the season.

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The following four pages are the sixth installment of the reprinting of "Blühende Kakteen"



FIG. 76. A typical "white patch" on the Little Karoo, with Mr. and Mrs. Thudichum searching for *Gibbaeum molle*.

A KOPPIE ON THE LITTLE KAROO

By H. HALL

EDITOR'S NOTE: For illustrations of the plants mentioned in the following article, refer to Jacobsen—"Succulent Plants" and Brown—"Succulents for the Amateur."

During the latter part of November, 1947, I took part in a collecting trip for succulents to add to our collection in the National Botanic Gardens, Kirstenbosch, and for the Karoo Garden at Worcester. The "Expedition" comprised the Director of the Gardens, Prof. R. H. Compton who is a plant collector of great experience, Miss Barker from the Kirstenbosch Herbarium, Miss Johns who is the teacher of Nature study here, and myself. Our destination was the eastern side of Cape Province where we were joined by Mr. G. G. Smith, plant collector and owner of a magnificent collection of Haworthias, and Miss Courtney-Latimer who is the Curator of the East London Museum. Finally, Mr. and Mrs. Thudichum of the Karoo Garden linked up with us, making eight in all.

Of the many interesting localities and amazing plants I was to see during the eleven days "out in the blue," (the 1,300 miles of territory covered) of moving swiftly from areas of winter rainfall in the west to those of summer rainfall in the east; of being temporarily marooned between swollen rivers many miles apart which were dry and dusty ravines a few hours before—it is not my purpose to dwell upon in this short

account. On the eighth day we said farewells to Mr. Smith and Miss Latimer who were continuing on their programme to explore some Bushmans Paintings farm while the rest of us commenced our more leisurely return towards the west again, towards the Little Karoo and the parched veld. It is about this area that I want to describe in more detail.

Very quickly we found ourselves back again in the dry and dusty conditions experienced during the first few days, with the now familiar stunted and heavily grazed vegetation; past Willowmore where I observed a much shriveled plant of *Aloe longistyla* in a tiny rock-garden in front of the Post Office, and which is mentioned here only because it had seed pods which were scattering its superb, winged seeds into the dusty street; through Oudtshoorn, once famous for its ostriches and where there are still to be found large flocks of the giant birds; through Calitzdorp, a small town which records summer shade-temperatures well over the hundred mark. Just beyond Calitzdorp we halted for a quick lunch and within ten yards of where the "eats" were, Prof. Compton found a superb specimen of *Huernia Pillansii* growing round the base, and amongst the stems of a bush of *Portulacaria afra*; there must have been at least two hundred little bristly stems of the plant, and it is one of

the gems of the *Stapelia* family. The rocky slope above us contained many and varied succulents. There were enormous rootstocks of a *Testudinaria* which was then without green shoots but specimens small enough to dig out eluded us. *Crassulas* of several kinds and the very variable and puzzling *Adromischus* grew everywhere, spotted leaved, wavy leaved or without markings of any kind. High up near the ridge grew some clumps of *Haworthia arachnoides*, wedged in the fissures of the rocks and much incurved—in fact, my first impression was that they strongly resembled some of the feathery *Mammillarias*.

All around grew large bushes of *Portulacaria* and a few specimens still bore traces of the minute pink flowers which tinted many of the slopes seen earlier in our travels further east.

A little way beyond Calitzdorp we turned off the road to find the "Koppie." Now we found ourselves traversing rough farm tracks and for several miles wandered deeper and deeper into the folds of the hills, across small, dried-up stream beds, over patches of jagged stones which threw us and our booty all over the place, until a rather deep drift prevented further progress with the vehicles. From this point, armed with our diggers and cartons we set off on foot towards a distant hill about a mile away. This time our guide was Mr. Thudichum who had been this way some ten years previously. As far as the eye could see, in every direction, were range upon range of hills merging into the distant horizon. Over all was the serene blue sky of the Karoo and the most perfect silence. The tramp across the rather flat, featureless valley was a hurried one, nor did I see many plants of interest. There were signs that the soil was rather "brack" and that it gets inundated when the infrequent storms do arrive. A greyish-stemmed *Psilocaulon* with small, pink flowers and squat bushes of a small-leaved *Ruschia*, also with pinkish flowers, were dotted about in the hard, smooth, silty soil.

Immediately at the foot of the Koppie the vegetation was very different indeed, but then so were the conditions. Large, rounded stones were strewn around the base of it, rolled down from above in geological ages past. Little more than 300 feet above the floor of the valley the Koppie appeared to be clothed in the usual karoo scrub, small, twiggy shrubs a few inches to a foot or two in height. The scant shade these things provide is invariably utilised by all manner of dwarf succulents. Once I observed four different kinds all sharing the protection afforded by one of these bushes which was little more than a foot in diameter. Very evident here was the accepted fact that the cool, southern

slope contained a larger plant population than the other side, and it is also true that some species are never found on both aspects, preferring the one, or the other, as the case may be. In themselves non-succulent, the shrubs are almost leafless in summer and apparently more highly drought-resisting than many succulents.

The first plants which drew my attention were large clumps of *Glottiphyllum*, sitting amongst the stones. The fat, erect, glossy-green and incurved leaves, and large yellow flowers will prove to be *G. regium*, I think. Less numerous were plants of the very broad-leaved *G. Neilii*, glaucous green in the hot, dry air. The only shade these two species obtained was from the the stones when the sun was low in the sky. Also near the base were many pinkish green clumps of *Gibbaeum Blackburniae*, and then my attention was drawn to another plant which was flush with the surface of the ground, just a glassy-green tip or two, barely visible, which proved to be *Gibbaeum molle*. How incredibly well hidden they were, and how well guarded against loss of moisture for surely 90% or more is below ground. A few feet higher up the slope someone mentioned *Haworthia truncata*! This was enough for me to leave off staring at the *Gibbaeums* to search for yet another species I had not previously seen in the wild. Soon I had spotted a small, blackish-green object, a leaf tip of one, all the rest of the leaves being completely under the soil, or stones. So numerous were they that I counted two dozen in about a square foot, but I had to scrape away dust and small stones to see them all. As well as hard, succulent leaves they have huge, swollen roots which both anchor them securely into the ground and form a useful store of food below ground.

Dotted about, still quite near the base of the hill, were small plants of the rare and fascinating *Anacampteros papyracea*, which has small, whitish scale-like leaves. About two inches tall, with stems that always seem to bend their heads downwards, they sat in full sun nor did they seem to have very deep roots. There were great numbers of *Crassula tecta*, again in full sun, with their whitish leaves held erect and close together, thus presenting the least area to the noon-day sun. I mention this because in cultivation in England the leaves are flatter disposed, and are less papillate owing to the less extreme conditions afforded them. Another rare *Crassula*, one which I had not seen before, was *C. sphaerocephala*, an inch or so in height, with leaves arranged crosswise. From the many atrophied specimens around, with the old, rounded inflorescences still attached, one assumes it is monocarpic, like *C. columnaris* which

was also present, looking for all the world like brown leather buttons. The genus *Crassula* was very evident there, other species collected or noted included *C. acutifolia*, *C. pyramidalis* which was more brown than green, stunted bushes of *C. arborescens* near the summit, compact dwarf bushes of *C. rupestris* and our old friend *C. lycopodioides*. The last named species was met with here and there as mere fragments, sometimes mixed up with the stems of a shrub-let or out amongst the rocks, yet they were all very bluish-green and shriveled. Having seen this, commonest of all *Crassulas*, cultivated commercially, hundred foot greenhouses devoted exclusively to this plant, the sight of wild fragments left me with a greater feeling of respect for it.

More species of *Anacampseros* were found as we climbed higher, *A. telephiastrum*, *A. Baeseckii*, others with hairy leaf-axils and small, dull brown leaves which are not yet recognized for the genus seems rather incompletely worked. All the specimens have flowered well since potted up and though some I thought to be the same species have produced flowers of a different colour, or size, or different kinds of seed. And by the way, surely no other kind of plant ripens its seed so rapidly as the *Anacampseros*. Invariably in the shelter of a rock or shrub grew small plants of *Haworthia viscosa*, dark coloured and well merged into the background colouring, their slender flower spikes invariably being the quickest clue to their whereabouts. Near the summit were specimens of the rare *H. Blackburniae*. It has long, green leaves, quite unlike the usual conception of this genus. Having hacked a few out of the rocky ground I learned that its narrow leaves are amply balanced by long, swollen roots in which its store of moisture is located. Miss Barker was quite excited about this plant for she told me that it was a species she herself had determined some years ago, and on this day had the thrill of finding in the wild state herself for the first time. Two species of the related *Apicra* were there, *A. aspera* and *A. deltoides*, with hard-pointed leaves. Fortunately for these plants there were few signs of over-grazing: in other parts of the country these, and the *Haworthias*, are always nibbled off in a dreadful manner. The growing points are the best, and since these produce the flowers it stands to reason that seeds never have a chance to aid them in their struggle for survival.

Occasionally we observed specimens of *Kleinia radicans*, though a much less rampant form than some noticed previously on the sandy flats near the Zuurberg Range, and where they formed green carpets beneath thornbush, their

prostrate stems all extending and radiating outwards from the trunks of their shade plant. Pleasant too when I noticed one or two pieces of our old friend *K. articulata*, and others which are *K. repens*, I think.

A few groups of *Aloe microstigma* grew near the base and in one or two places higher up. Though not in flower they supplied a delightful bit of colour with their reddish leaves, much speckled with pale spots. The widely scattered, very variable *Cotyledon orbiculata* was there but none of the luxuriant types we had seen earlier on the trip. The genus *Adromischus* had its representatives there, at least a dozen different kinds were seen, varying either in leaf-shape or colouring, wavy edged leaves or plain, unmarked leaves or delightfully spotted with purple, and red. It seems to be another polymorphic group of plants. Some plants with swollen root-stocks and rosy red flowers were species of *Pachypodium*, and requiring a charge of dynamite to get them out of the solid rocks in which their roots had sought purchase; *Pelargonium carnosum* and *P. alternans*, leafless and thus hard to notice at this season. Small tufts with attractive white flowers proved to be the choice *Trichodadema mirabile*, a member of the group of Mesems with a diadem of hairs at the leaf-tips.

Of *Stapeliads* there were remarkably few, though little clusters of round joints, barely visible against the brown rocks and in the shadows proved to be *Piранthus Pillansii*, and a few are *Duvalias* which have not yet flowered. Then about six specimens of *Trichocaulon Piliiferum* were seen, thick-stemmed tuberculate, earth coloured, and scorning the shade.

And then it was time to tear ourselves away from this Karoo paradise. More miles had to be traversed before sundown. We had been around the Koppie and to its summit where a strong wind tore at the scant shrubs which crowned it. My impressions were that all the plants were very, very dry, mostly shrivelled yet so alive and waiting patiently for the few inches of rain which might, or might not, freshen them up next winter; that all were very slow growing types for, small that most plants were, the remains of previous growth on many indicated their great age, especially *Gibbaeum* and *Glottiphyllum*; that they will endure much greater dryness than most growers realize.

As we neared the vehicles I gave one last look at the Koppie and it looked very serene and peaceful. Soon it was just a part of the colourful haze which was slowly creeping over the veld as the afternoon wore on.

The following day I was to see many more rare plants before we had done with the Little

Karoo, and the end of our travels. We sped past acres of *Gibbaeum pubescens* by the roadside, so numerous that it gave a silvery green hue to the landscape; past areas where the giant form of *G. Heathii* grew; past the curious level, white patches of quartz which look quite barren until ones eyes become accustomed to the glare reflected from them, and then realize that one is surrounded by specimens of *Gibbaeum pilosulum* and *G. molle* peeping up from their stony bed. So low down were they in the hard ground that the fine surface layer of quartz is slightly above the level of the tips of the leaves

and it is no mere figure of speech to say that they can be stepped on without injury. It was noticeable that these ceased to grow as abruptly as the margin of the white patches changed into normal scrub once more. I was privileged to visit the area where the amazing *Muiria Hortenseae* grew, perhaps the most astonishing of all succulents, growing cheek by jowl with the snow-white *Gibbaeum album*, and both species in flower together. We found splendid specimens of the bi-generic hybrids, too, although Jacobsen states that the two plants grow forty miles apart! But that is another story.

GRAFTING CACTI

By ROBERT BLOSSFELD

From old literature discovered by Daniel Neumann. Years ago Robert Blossfeld was a leading cactus dealer in Potsdam, Germany.

Since men have grown plants for their fruits and for ornamental purposes, grafting has been practised and, together with hybridizing, it is perhaps the most interesting and successful method of cultivation. Apart from its ornamental possibilities, grafting is practised as a profitable means of propagation.

Slow growing and very delicate varieties of cacti, which cannot be grown under the same conditions as they have in their native habitat, are grafted on a robust-growing stock. *Astrophytum asterias*, *Obregonia Denegrii*, *Ariocarpus*, *Leuchtenbergia principis*, etc., become really beautiful and quick growing plants when grafted. New introductions and valuable rarities are also grafted for safety.

Often a plant which is decaying at the base can be preserved by cutting away all the diseased portions and then grafting the crown. If also the growing tip is damaged, at least some new shoots may be obtained from sound areoles for propagation. Of course, it is nonsense to graft a plant which grows soundly and well on its own roots. Nothing but a swollen distortion of the scion would be the result, and the plant which receives much more food from the stock than it can assimilate may at last burst.

Freshly imported plants which are shipped in from the field are generally shrivelled more or less and must be re-established before they can be grafted. Roots which are dead or broken must be cut away in order to avoid infection with rot and the wounds allowed to dry and heal for a time. Then they are planted out in a hotbed and must gradually be accustomed to warmth, light and moisture. When they have started to grow again, they may be grafted if this is desirable. Plants which arrive late in Au-

gust should be potted up at once and the pots placed in the hotbed; then one need not disturb the plants when bringing them into the greenhouse in October. Grafting is not advisable in late autumn and winter. If importations arrive so late that they cannot be established before winter, they are best planted in sand and kept rather cool and dry in a light place until February or March, when they will start to grow and may be planted in the hotbed. They will stand a long resting period better than too much moisture during the cold, dark season. If some plants have made a light green or white growth in the box, they must be well shaded at first. This occurs sometimes with plants which are very soft in tissue, such as *Rebutias*, some *Lobivias*, *Mammillarias* and *Cerei*. If such a shoot should have grown too long so that it deforms the plant, it may be cut off and grafted, when the growth is rich in sap and has turned green after some time under cultivation in the hotbed. The mother plant may remain on its own roots or may be grafted, too. In any case, it will make many side-shoots which may be detached and either grafted or rooted in sand.

The most surprising and pleasing success of grafting is obtained with some of the fine flowering species such as *Rebutia*, *Lobivia*, *Epiphyllum*, *Echinocereus Knippelianus*, and *Gymnocalycium*, etc. I saw one *Rebutia* of hen-egg size, grafted on *Harrisia Jusbertyi*, which was almost covered with about 250 buds and flowers. Grafted plants of *Rebutia* may even flower twice a year. There exists also a South American species of *Opuntia* which, if used as stock for grafting *Epiphyllum* (*Zygocactus*), induces the scion to an almost unbelievable floriferousness. Real show specimens are obtained

on this stock within a short period.

Cristates are generally grafted, as this is the quickest method of propagation and very often the only way to keep them alive. Such crested heads can be cut into many small pieces which are placed on a good stock where they develop very quickly.

Young seedlings of slow growing varieties are grafted by amateurs in order to avoid losses during the cold season and on a large scale by commercial growers in order to get them to grow as quickly as possible to saleable size. For this purpose the pea-sized seedlings are grafted on young soft-fleshed seedlings of *Cereus* about 1 in. high. When transplanting later on, the stock plant should be half embedded in the soil and when potted it should be completely hidden so that the graft seems to grow on its own roots. Generally the scion will make roots as soon as it is in touch with the soil and then one can take off the old stock plant. If the stock plant has become too tall, the lower part may be cut away, leaving only as much as 1 or 2 in. at the scion. This grafted cutting should be placed in a dry atmosphere for one day or more until a kind of cuticle has formed over the cut surface. Then it is treated like all cuttings of cacti (rooted in sand or pulverized charcoal, being placed not deeper than $\frac{1}{2}$ to 1 inch below the surface of the sand). Sometimes also a temporary intermediate grafting is made on *Opuntias* or *Echinopsis*, which are so juicy that the scion reaches several times its original size in the very shortest time imaginable. But after some time the scion must be removed and rooted or re-grafted as this is not a permanent union.

METHODS OF GRAFTING

If you have a fine plant of *Astrophytum asterias* which is decaying at the base and you wish to preserve it, a stock is selected which has at least the same diameter as the scion and which corresponds to the further directions given under "Selection and cultivation of Stocks." A clean sharp knife (razor) is indispensable; for larger plants a rustproof and carefully sharpened kitchen knife is best. The head of the stock plant is cut away at the desired height with one stroke of the knife so that a perfectly smooth surface is left on the cut ends. Now you must work quickly and pare away slantwise the edges all round the cut surface,* removing one long triangular strip about $\frac{1}{8}$ to $\frac{1}{4}$ in. thick outside and as broad. Then put the knife in water in order to prevent tarnishing, dry it and cut away the base of the *Astrophytum asterias* as far as necessary in the same manner. If the cut surface of the head should have brown

or black spots or veinings another slice must be cut away until a quite healthy tissue is left. Then the scion is pressed firmly on the cut surface of the stock plant.

In order to avoid the sap drying on the cut surface of the stock plant it is advisable, after having removed the top, to cut a thin slice off which remains as protection on the stock plant until the scion is prepared. Then the slice is drawn away and the cut surfaces are quickly



FIG. 77. Rat-tail grafted on *Hylocereus*.

pressed together. The mucilaginous sap of the plants causes the scion to slip away very easily. In order to prevent this, two to five thin rubber bands are drawn over the bottom of the pot and from above over the center of the scion so that they firmly press the two parts together in the desired position. Instead of rubber bands, ends of woollen thread, bearing a weight of about $1\frac{1}{2}$ oz. at each end may be hung over the scion to press it down and also the elasticity of a split bamboo may be used for the same effect by fixing one end of it horizontally to the wall and placing the scion under the other elastic free end of the cane. By all these methods a constant gentle pressure is obtained, which causes the cells to heal and grow together if the graft remains untouched.

During this time the graft must be placed in a close and warm room and be kept fairly moist, with little or no shade. Cold, rainy days sometimes prevent success, especially with larger

*"Cacti for the Amateur," pg. 117, fig. 2.

plants, whilst during very hot weather grafted seedlings easily dry up and must be shaded somewhat. The best time for grafting is, in a northern climate, from mid-May until July, and in sunny warm weather the tissues have become thoroughly united within three or four days. Then the rubber bands, etc., may be taken away carefully. After eight days the grafts are best planted in a hot bed. But great care must be taken that no water comes in contact with the fresh cut surface until the wounds are healed and dried.

In some cases, e.g. with cristates which are cut into small pieces, a cleft graft or saddle graft will be better. Then needle-like cactus spines may be thrust through the portions, fixing them in the desired position. Slender and weak-stemmed plants like *Aporocactus flagelliformis*, are either divided by a longitudinal section from the growing tip down to the base, when both parts are grafted horizontally so that they will grow on by numerous branches; or they are grafted slant-wise so that they grow on with a single growth, which can be cut down later on and induced to form branches. Epiphyllum (*Zygocactus*) and *Rhipsalis* are joined slantwise to the stock, bevelling the scion and the stock plant instead of making the transverse cut described above. The two long-oval cut surfaces are pressed well together and one or two cactus spines are thrust through both parts transverse-

ly. If necessary, the scion may be fixed in an upright position on a stick. (See pg. 121, "Cacti for the Amateur.")

To be continued

BOOK NOTES

ABBEE GARDEN PRESS

FLOWERING YOUR CACTI—Lamb. This 56 page book takes about 100 representative plants from any collection and discusses their culture and concludes with a month by month what-to-do guide. Written for the amateur and illustrated with 21 photos. Postpaid 90c. Foreign \$1.00.

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FIG. 78. *Eriocereus Martinii* produces many flowers and is very easy to grow. See next page.



SPINE CHATS

LADISLAV CUTAK



Now that the hot season is on we can expect lots of flowers from our night-blooming Cerei. Here at Shaw's Garden we have been more or less specializing in fast growing species, such as *Acanthocereus*, *Eriocereus*, *Hylocereus* and *Selenicereus*. Some of the vining cacti have reached the roof of the house and each year have borne an abundance of flowers. Because *Eriocereus Martinii* is one of the easiest species to grow, flower and fruit it will hold our attention for the moment. One should really have a greenhouse to grow it properly unless you live in frostless sections when it can be left outdoors all year round. It will need a good trellis for a support and for this reason it is hardly to be recommended as a pot plant. The plant will grow in almost any kind of soil provided there is adequate drainage.

Eriocereus Martinii is native to Argentina and was described by Labouret in 1854 under the generic name of *Cereus*. The old stems become nearly terete and spineless, an inch or more in diameter, but the young ones are quite vigorous, pointed, and tuberculately 4 to 6 angled. Areoles are conspicuous, circular in outline, 2 to 3 cm. apart and filled with whitish felt, each one displaying a stout, straw-colored central spine with a reddish black tip and base. The central spine measures $\frac{3}{4}$ to $1\frac{1}{4}$ inch long. Radials on some slender juvenile stems are nearly bristlelike, white, 7 to 8 in number, spreading, up to 4 mm. long; while on others and particularly on older stems they are very short, hardly noticeable, only 1 mm. long, usually appearing in the lower half of the areole. The stems and branches can be described as grass green in color. Flowers average 9 inches long and are quite odoriferous, borne singly at areoles near the ends of the branches, or as I have noticed about 16 inches below the tips. The outer perianth segments are lanceolate, acuminate, light green, often flushed red or pink at the tips, 7 cm. long. Inner perianth segments are as long or perhaps a trifle shorter than the sepals, oblanceolate to obovate, short-acuminate, white with a greenish base or flushed with pale green through the middle. The flower-tube is green, furrowed, slightly tuberculate, with reddish scales that become elongated above, the uppermost being nearly 4 cm. long, bearing white wool in the axils. Stamens are numerous and in two series; the inner ones attached to the tube, commencing about 4 cm. above the ovary and extending up to the throat, 8 to 11 cm. long; the outer ones attached to the top of the throat, only 5.5 cm. long. Filaments are greenish, lighter toward the top. Anthers are flattened, pale or maize yellow, basifixed, 2 to 3 mm. long and 1 to 1.5 mm. wide. The style is 18 cm. long, greenish throughout, fading towards the top. Stigma lobes are 11 to 12 in number, pale green to deep seafoam green in color, obtuse, and 1.5 cm. long. Ovary is tuberculate, bright green, each tubercle crowned by a small reddish scale, white woolly in the axil. The ovary ripens into a round reddish fruit that splits and reveals black seeds imbedded in white juicy pulp. Seeds germinate readily and produce flowering specimens in 5 to 7 years.

* * *

Certain plants possess the property of accumulating large amounts of organic acids in their leaves or stems

persistently while others are formed principally during the night and disappear again during the day. These diurnal fluctuations in acid content are characteristic of the group of plants known as succulents, and the remarkable metabolism which they exhibit is generally known as succulent or crassulacean metabolism. One of the earliest observations on acid metabolism in succulent plants was made by Benjamin Heyne who in 1815 noted that the leaves of *Bryophyllum calycinum* have a more acid taste in the morning than late in the afternoon. Walter and James Bonner undertook the study of the role of carbon dioxide in acid formation in order to provide critical evidence as to whether acid formation in succulents is dependent on carbon dioxide partial pressure since this would be a very good indication that the acids are found by carbon dioxide fixation. It was found that temperature and light play a great part in this act. In three species of *Bryophyllum* and one of *Crassula* it was found that acid formation proceeds rapidly in the dark at low temperatures and less rapidly in the dark at high temperatures, while acids are lost at high temperature in the light. For further details see "The Role of Carbon Dioxide in Acid Formation by Succulent Plants" in the American Journal of Botany 35 : 113-117, February, 1948.

* * *

In the early part of May I received an invitation to speak before the Floriculture Club of Kirksville, Mo. This town, home of two colleges, is located in north-eastern Missouri about 200 miles from St. Louis. It is also the home of three cactophiles, members of our national society. All three are keen students of plant life and fine gardeners. Mrs. L. A. Phillips possesses a good collection of Haworthias and seems to prefer this group to any other succulents, although *Echeverias* run a close second. Dr. and Mrs. Lewis Clevenger have a spacious sunroom in their lovely home and most of their plants are in small pots on shelves in spacious windows. As you might suspect, Clara Clevenger is the cactus lady of the household while Lewis Clevenger leans more towards the Iris. He became interested in them about ten years ago when the beautiful big new hybrids were becoming popular. Since he is a student and teacher of Biology with a very special interest in plant genetics, he became an eager hybridizer. He has named and introduced a number of seedlings such as HOWDY, KIRKMO, THE CHIEFTAIN, INDIAN GIFT in 1946; UMBA and WINEBERRY in 1947 and EVENGLOW in 1948. Clara Clevenger became interested in succulents in 1937 because she had found that her original love, Bulbous plants, were ugly and ungainly except for the one week of glorious bloom they offered. On the other hand, Succulents were beautiful *all the time*, even when not in flower. She is especially fond of Haworthias, Gasterias and *Echeverias* but likewise owns a number of Mammillarias and other cacti. Both of the Clevengers are teachers at the Northeast Missouri Teachers College where they have taught for about twenty years: Lewis in Biology and Clara in Economics and Sociology. Their graduate work was done at Cornell University where they received their Ph.D.'s in 1934.

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